

**THE MORRIS ROAD  
DRAINAGE STUDY**

**A Final Report to the  
WORCESTER COUNTY COMMISSIONERS**

**COASTAL ZONE  
INFORMATION CENTER**

DEC 1989

as prepared by

*Bay Country Consultants*

HD  
1683  
.M2  
M67  
1989

The contract was financed in part by the Coastal Resource Division, Maryland Department of Natural Resources through a grant provided by the Coastal Zone Management Act of 1972 as administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration.

MD W.P.

Maryland Coastal Zone Management Program

HD 1582.002 m67 1885

## INTRODUCTION

The Morris Road Drainage Study was financed by the Worcester County Commissioners through a grant by the Coastal Zone Management Programs of the National Oceanic and Atmospheric Office of Coastal Resources Management. Morris Road has been targeted for this funding because of the severe flooding which occurs there on a predictable basis. Surface drainage, as it currently exists, is far from adequate. The road itself is often made impassable by stormwater which is trapped by clogged or inadequate ditches. Dwellings become isolated and crops drowned. Another potential hazard is the presence of high tension power lines in an area subject to severe flooding.

The intent of this study is to determine, from field study and existing data, the most practical and cost effective methods of reducing to minimal levels the impact of up to a fifty year storm event. It should be noted that environmental parameters are considered to be of prime importance. These parameters include, but are not limited to, sediment and erosion control, ecosystem development, impact to existing wildlife habitat and the preservation of interior and nontidal wetlands. Planned improvements developed in this report will ensure that proper and necessary environmental safeguards are responsibly dealt with.

Finally, the last section of this study shall discuss possible funding sources for the implementation of the recommended improvements. Permit applications, as required, will be developed and included here along with operation management plans. Cost estimates for the suggested construction will be supplied to the county commissioners and located in Appendix A.

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## I. An Overview of the Study Area

The existing drainage patterns and outlets within the watershed have become blocked and overgrown. Some new ditching has been introduced which ends abruptly and without any functional outlets. They simply flood greater areas of the same watershed. In some instances interior wetlands occur.

The Morris Road study area is comprised of approximately 372.2 acres; 75 acres of which are located in Sussex County, Delaware. Of this, 23.5 acres are within the town limits of Selbyville, Delaware. This portion of the contributing watershed is adjacent to, but not controlled by, the Sandy Branch Tax Ditch Association. Zoning in Selbyville is residential with a strip of business along the highway. County zoning is AR-1 Agriculture and light residential.

The remaining 297.2 acres are located within the jurisdictional boundaries of Worcester County, Maryland. Currently there is no Maryland based public ditch association or public watershed association regulating the problem watershed. The zoning designation of the Maryland portion of the study area is completely A-1, Agriculture. Though a small corner of adjacent property located along Route 113 and just south of Carey Branch is zoned B-1, Business; it remains outside of the limits of this report. Little or no further development is envisioned within the foreseeable future.

Exhibit 1.1 is a plat showing the boundaries of the watershed, existing ditching, soil types and locations (as taken from the soil surveys of both Worcester and Sussex Counties), and current land usage.

In keeping with the intent of the study to view all environmental parameters as being of prime importance, the Heritage Foundation was contacted and asked to report the presence of any endangered species which might be located within or downstream of the study area. Though a written report has not yet been received, verbal communication with them suggests that there are no endangered species within the area. A minutes report (showing approximate location only) does note that in the area of Bishopville the "Spotfin Killifish" (*Fundulus Luciae*) has found sufficient habitat to reside. Though this fish is not on the endangered list, it is unusual to the Lower Shore. The improvements as planned to the watershed will not disturb the fish's habitat.

A copy of the Heritage Foundation report will be presented to the Worcester County commissioners as an addendum to this study as soon as it is available.

Attached is a Tax Map showing the delineation of the properties within the watershed and labeled Exhibit 1.2. This is followed by a listing of the property owners.





# List of Current Property Owners

Property	Owner	Address	Acres
127	Norman T. Jones	Morris Rd., Bishopville	3.3
118	James E. Vachris	Morris Rd., Bishopville	1.54
9	Harold J. Townsend	Morris Rd., Bishopville	12.35
129-1	Charles W. Anderson	Morris Rd., Bishopville	9.21
6	Robert Lee Showell	Morris Rd., Bishopville	3.28
7	Robert Lee Showell	Morris Rd., Bishopville	3.0
8	Ella Camper	Morris Rd., Bishopville	1.0
10	Gladys L. Mitchell	Morris Rd., Bishopville	2.5
11	Helen Handy Smith	Morris Rd., Bishopville	2.51
12	Trustees of St. Matthews	Morris Rd., Bishopville	0.344
112	Wallace L. Showell	Morris Rd., Bishopville	0.341
114	Luther Kitt	Morris Rd., Bishopville	0.199
54	Raymond T. Stevens, Jr.	Morris Rd., Whaleysville	13.94
13	Donald Hudson	Morris Rd., Bishopville	50.0
6-A	Harry L. Bunting	Morris Rd., Bishopville	59.12
A-12	Middle States Holding	Morris Rd., Whaleysville	61.84
A-11	Betty Marie Bivens	Morris Rd., Bishopville	17.19
10-A	Catherine Baker	Morris Rd., Bishopville	2.57
9-A	James & Norman Baker	Morris Rd., Bishopville	1.23
16	Eunice M. Savage	Morris Rd., Bishopville	0.548
18	Clarence Hall	Morris Rd., Bishopville	0.773
7-A	Harry & M. Showell	Morris Rd., Bishopville	3.38
8-A	Mamie Mitchell	Morris Rd., Bishopville	5.5
17	Lester D. Justice	Morris Rd., Bishopville	0.387
1	Trustees of Mt. Calvary	Morris Rd., Bishopville	2.29
16-A	Clifton R. Parker, II	Morris Rd., Bishopville	
15	Paul Burns	Rte. 113, Bishopville	0.986
129-4	Elisha Dale Gray	Morris Rd., Bishopville	0.25
129-3	William Felton	Morris Rd., Bishopville	0.150
129-2	Norman B. Tingle	Morris Rd., Bishopville	21.07
128	Joseph A. Lorenzo	Rte. 113, Bishopville	1.3
5	Gertrude Evans Bailey	Morris Rd., Bishopville	3.28
4	Elisha Dale Gray	Morris Rd., Bishopville	.250
3	William Felton	Morris Rd., Bishopville	.150
2	Norman B. Tingle & Geo & Howard	Morris Rd., Bishopville	21.07
13	(No further information available from the tax office.)		
23	Milton & Helen M. Belote	Morris Rd., Bishopville	2.31

## II. Review of Governmental Policies

### FEDERAL LEVEL

Though this study is primarily concerned with surface drainage of Morris Road and, as has been stated, little or no future development is expected in the area, it should be noted that development of any sort within the limits of the area may have an effect on the character of the watershed and its discharge.

In dealing with surface drainage, the primary federal agency is the Army Corps of Engineers, by authority of the Clean Water Act (among others). A new extension of the act stems from Section 404 and will deal specifically with nontidal wetlands. This will disallow the altering of wetlands without a permit. A copy of the currently used guidelines for application and a copy of an application for permit to alter jurisdictional wetlands are included as Exhibit 2.1.

The following excerpts are taken from the "Federal Manual for Identifying and Delineating Jurisdictional Wetlands" and describe the three criteria for determining nontidal wetlands:

- 2.0 "Wetlands possess three essential characteristics: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology, which is the driving force creating all wetlands."
- 2.1 "...hydrophytic vegetation is defined as macrophytic plant life growing in water, soil or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content."
- 2.6 "Hydric soils are defined as soils that are saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions in the upper part. . . In general, hydric soils are flooded, ponded or saturated for usually one week or more during the period when soil temperatures are above biologic zero (41° F). . ."
- 2.8 "Permanent or periodic inundation, or soil saturation to the surface, at least seasonally, are the driving forces behind wetland formation. The presence of water for a week or more during the growing season typically creates anaerobic conditions in the soil, which affect the types of plants that can grow and the types of soils that develop. Numerous factors influence the wetness of an area . . . Of the three technical criteria for wetland identification, wetland hydrology is often the least exact and most difficult to establish in the field, due largely to annual, seasonal and daily fluctuations."



## Federal Level cont'd

- 2.10 The technical criteria are mandatory and must be satisfied in making a wetland determination. Areas that meet the NTCHS hydric soil criteria and under normal circumstances support hydrophytic vegetation are wetlands. . ."

"The Federal Manual for Identifying and Delineating Jurisdictional Wetlands" was published as an interagency cooperative publication by the Fish and Wildlife Service, the Department of the Army, the Environmental Protection Agency, and the Soil Conservation Service in January, 1989.

## MARYLAND STATE LEVEL

The Department of Natural Resources is a state regulatory agency whose authority comes from the Annotated Code of Maryland; Natural Resources; Title 9. Subtitle 102 of Title 9 is a declaration of public policy. An excerpt follows: "In many areas of the state much of the wetlands have been lost or despoiled by unregulated dredging, dumping, filling, and like activities, and the remaining wetlands are in jeopardy of being lost or despoiled by these and other like activities. The loss or despoliation will affect adversely, if not eliminate entirely, the value of the wetlands as a source of nutrient to finfish, crustacea and shellfish of significant economic value; the loss or despoliation will destroy the wetlands as a habitat for plants and animals of significant economic value and eliminate or substantially reduce marine commerce, recreation and aesthetic enjoyment . . . " (Annotated Code 1957, Art. 66C, & 718; 1973, 1st Sp. Sess., Ch. 4 & 1.)

The State of Maryland is also adopting a nontidal wetlands law which may be reviewed at the Planning and Zoning Office of Worcester County. This regulation accepts the federal guidelines for identifying wetlands and is expected to become effective by December 31, 1990. Note that the provisions of these regulations can be quoted as stating:

### Regulation .05 Exemptions from Permit Requirement

2. Repair and maintenance of existing structures are exempt when conducted so as to minimize impacts to nontidal wetlands and if conducted within certain time limits.
3. Activities in isolated nontidal wetlands of less than one acre having no significant plant or wildlife value are exempt.
4. Activities for which the entire impact is less than 5,000 square feet of nontidal wetlands having no significant plant or wildlife value are exempt.
5. BMPs (best management plans) and other conditions apply to activities being conducted under exempt status.
6. Notice to the department and authorization to proceed is required prior to conducting certain exempted activities.

### Regulation .13 Agricultural Activities

1. Certain on-going agricultural activities such as repair and maintenance of drainage ditches, subsurface drains and water control structures are exempt.
2. Activities conducted in association with public drainage regulations or on land laying fallow as part of a rotational cycle or authorized set-aside are exempt.

The general public, as well as, any drainage associations and the county should be aware of these regulations and the need to determine by means of the "Federal Manual" whether or not a planned project is located within a jurisdictional nontidal wetland or it's associated buffer.

The Maryland Department of the Environment receives the authority for their regulatory function from Section 401 of the Clean Water Act, and from the Health-Environmental Law of Maryland. Prior to any developmental activities in state wetlands (i.e. dredging, filling, building, watercourse change, etc.) a Water Quality Certification must be obtained from this office. A copy of an application form for this is included as Exhibit 2.2. A Water Quality Certification shows compliance with the state's water quality standards which are codified in COMAR 10.50.01, Water Pollution Control Regulations.

### COUNTY LEVEL

The Worcester County commissioners have adopted a Comprehensive Land Use Plan associated with their goals for development. Recommendations of this plan suggest that the area of the Morris Road Drainage Study remain agricultural. Attached is Exhibit 2.3 which is a map copied from the comprehensive plan titled "Worcester County Land Use Plan, Map 2.1". This map exhibits graphically the proposed pattern of development for the county. The official Land Use Map, as well as, a copy of the Full Comprehensive Plan may be reviewed at the Worcester County Office of Planning and Zoning.

The Worcester District Soil Conservation Board of Supervisors adopted a policy of requiring a fill permit or a release from the Corps of Engineers when a nontidal wetland was in danger of being despoliated in June of 1987.

Instruction Booklet for the State of Maryland and the U.S. Army Corps of Engineers

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# JOINT PERMIT APPLICATION

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for construction in any floodplain, waterway or wetland area in  
Maryland

EDITION 1-1988

January, 1988

## JOINT FEDERAL / STATE APPLICATION FOR THE ALTERATION OF ANY FLOODPLAIN, WATERWAY, TIDAL OR NON-TIDAL WETLAND IN MARYLAND

- All applications must be accompanied by plan drawings which show the location and character of the proposed work. For specific information on what is required on the plans, refer to the instruction package. 8½" x 11" black & white drawings are required for every application. Full construction plans are required for projects submitted to the Waterway Permits Division.
- Any application which is not completed in full or is accompanied by poor quality drawings may be returned and will result in a time delay to the applicant.
- If you need help understanding how to fill out the application form, please refer to the instruction booklet.

**8**

### APPLICATION NUMBER:

(To be assigned by the agencies)

#### 1. APPLICANT INFORMATION:

Name: \_\_\_\_\_ Telephone: (\_\_\_\_) \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

#### 2. AGENT / ENGINEER INFORMATION:

Name: \_\_\_\_\_ Telephone: (\_\_\_\_) \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

#### 3. PRINCIPAL CONTACT, if not the applicant:

Name: \_\_\_\_\_ Telephone: (\_\_\_\_) \_\_\_\_\_

#### 4. PROJECT DESCRIPTION:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### 5. PROJECT PURPOSE:

☐ Shore Erosion Control

☐ Utility Installation

☐ Create Waterfowl Habitat

☐ Temporary Construction

☐ Beach Nourishment

☐ Residential/Commercial Development

☐ Other: (describe) \_\_\_\_\_

☐ Erosion/Sediment Control

☐ Improve Navigable Access

☐ Improve Fish Habitat

☐ Stream Channelization

☐ Maintenance/Repair

☐ Small Pond

☐ Storm Drain/Stormwater Management

☐ Marina

☐ Fill

☐ Bridge

☐ Dam

☐ Road

☐ Culvert

#### CERTIFICATION:

I hereby designate and authorize the agent named above to act on my behalf in the processing of this application and to furnish any information that is requested. I certify that the information on this form and on the attached plans and specifications is true and accurate to the best of my knowledge and belief. I understand that any of the agencies involved in authorizing the proposed works may request information in addition to that set forth herein as may be deemed appropriate in considering this proposal. I grant permission to the agencies responsible for authorization of this work, or their duly authorized representative, to enter the project site for inspection purposes during working hours. I will abide by the conditions of the permit or license if issued and will not begin work without the appropriate authorization. I also certify that the proposed works are not inconsistent with Maryland's Coastal Zone Management Plan.

APPLICANT MUST SIGN: \_\_\_\_\_ Date: \_\_\_\_\_

PLEASE COMPLETE THE REVERSE SIDE

DNR/WRACE 4345 (12/87)

**6. PROJECT LOCATION:** This project is in ☐ Tidal ☐ Non-Tidal Waters. (Please Check One)

County: \_\_\_\_\_ Name of Waterway: \_\_\_\_\_

Site Address or Location: \_\_\_\_\_

Directions from nearest intersection of two state roads: \_\_\_\_\_

County Book Map (A.D.C.) Coordinates: Page: \_\_\_\_\_ Letter: \_\_\_\_\_ Number: \_\_\_\_\_

**7. TYPE OF PROJECT:**

Work Proposed	Overall Length (in feet)	Average Width (in feet)	Maximum Distance Channelward From Mean High Water For projects in tidal waters (in feet)
<input type="checkbox"/> Bulkhead	_____	_____	_____
<input type="checkbox"/> Revetment	_____	_____	_____
<input type="checkbox"/> Vegetative Stabilization	_____	_____	_____
<input type="checkbox"/> Gabions	_____	_____	_____
<input type="checkbox"/> Groins or Jetties	_____	_____	_____
<input type="checkbox"/> Boat Ramp	_____	_____	_____
<input type="checkbox"/> Pier	_____	_____	_____
<input type="checkbox"/> Breakwater	_____	_____	_____
<input type="checkbox"/> Road Crossing	_____	_____	_____
<input type="checkbox"/> Utility Line	_____	_____	_____
<input type="checkbox"/> Outfall Construction	_____	_____	_____
<input type="checkbox"/> Dredging	_____	_____	_____
<input type="checkbox"/> New <input type="checkbox"/> Maintenance	_____	_____	_____
<input type="checkbox"/> Hydraulic <input type="checkbox"/> Mechanical	_____	_____	_____
<input type="checkbox"/> Other: For other projects, please supply project dimensions including the area of disturbance (acreage), volume of fill (cubic yards), type of fill, and area (acreage) of wetlands to be impacted. _____			

**8. PROPOSED STARTING DATE:** \_\_\_\_\_

**9. CONTRACTOR'S NAME** (If known): \_\_\_\_\_

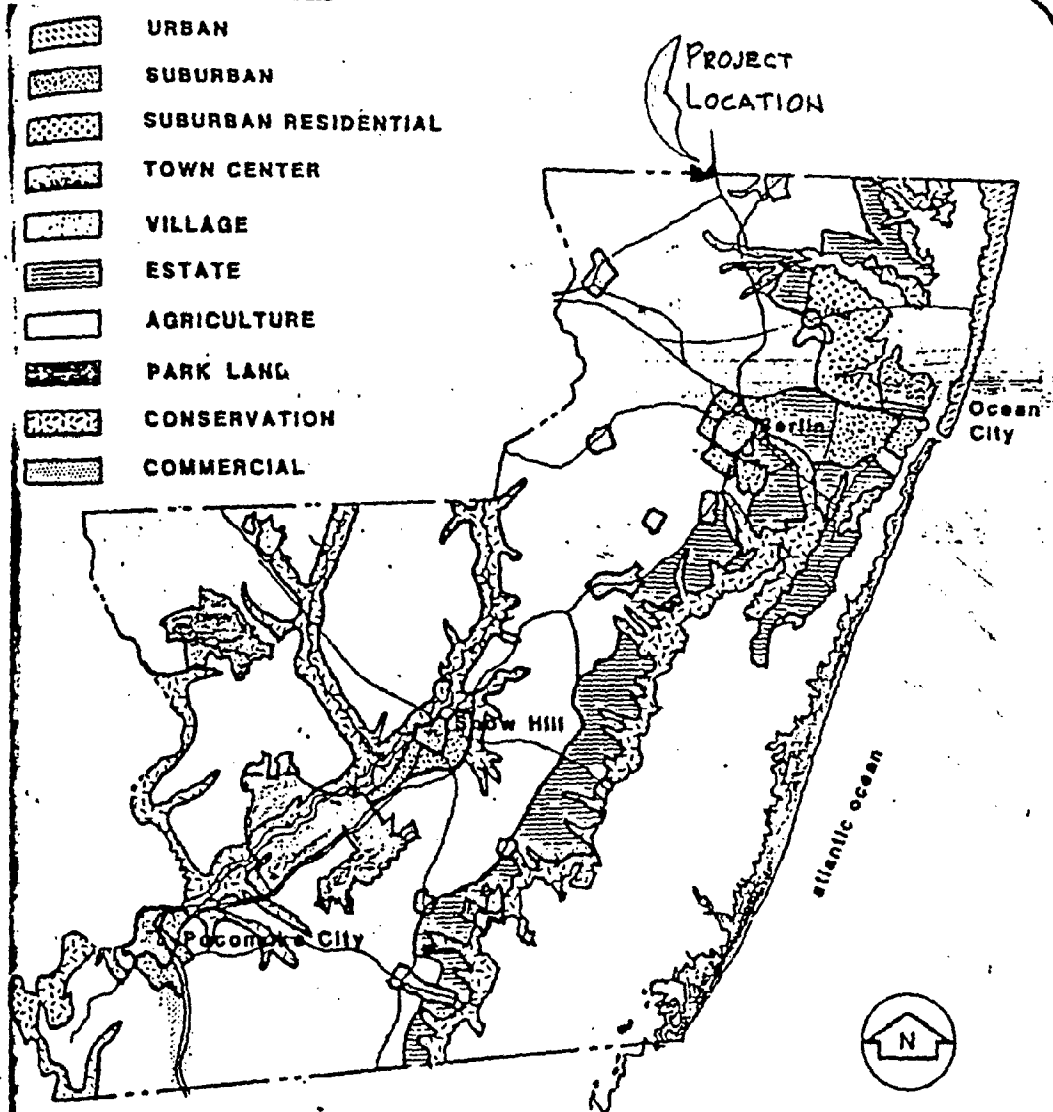
**10. LAND USE:**  
Current Use Is:   ☐ Agriculture   ☐ Wooded   ☐ Marsh/Swamp   ☐ Meadow   ☐ Developed  
Present Zoning Is:   ☐ Residential   ☐ Commercial   ☐ Agriculture   ☐ Other: \_\_\_\_\_

**11. OTHER PERMITS REQUIRED:**   ☐ Building Permit   ☐ Soil Conservation District   ☐ Other: \_\_\_\_\_

**12. NOTIFICATION OF ADJACENT PROPERTY OWNERS:**  
The applicant/agent will be informed by the permitting agencies when notification of adjacent property owners is required.

**IMPORTANT: PLEASE MAIL YOUR APPLICATIONS TO THESE AGENCIES**

Federal Government	State Government
U.S. Army Corps of Engineers Baltimore District P.O. Box 1715 Baltimore, Maryland 21203-1715 Attention: NABOP-R (301) 962-3670	For Tidal Waters, please submit one copy of the application to:  Tidal Wetlands Division Water Resources Administration Tawes State Office Building D-4 Taylor Avenue Annapolis, Maryland 21401 (301) 974-3871  For Non-tidal Waters, please submit one copy of the application to:  Waterway Permits Division Water Resources Administration Tawes State Office Building D-2 Taylor Avenue Annapolis, Maryland 21401 (301) 974-2265



# **WORCESTER COUNTY** **LAND USE PLAN**

MAP 2.1

### III. Soils Description

The Soil Surveys of Worcester County and Sussex County, as published by the United States Department of Agriculture - Soil Conservation Service, map the study area as having the following soils:

<u>Map</u> <u>Designation</u>	<u>Soil</u> <u>Classification</u>	<u>Hydrologic</u> <u>Soil Group</u>
Pe	Plummer loamy sand	B-D
Pt	Portsmouth silt loam	D
Pm	Pocomoke loam	C
Pk	Pocomoke sandy loam	C
My	Mixed alluvial land	
KsA	Klej loamy sand, 0-2% slopes	B
KsB	Loamy Sand, 2-5% slopes	B
KI	Klej loamy sand	B
Os	Osier loamy sand	B-D
Wo	Woodstown sandy loam	C
WdA	Woodstown sandy loam, 0-2% slopes	C
WdB	Woodstown loamy sand	C
Fa	Fallsington sandy loam	D
LmB	Lakeland loamy sand, clayey substratum, 0-5% slopes	A

Note: (My) Mixed alluvial land has no determined hydrologic soil grouping. For the purposes of performing TR-55 calculations we shall assume it to be Class D.

## Hydrologic Soil Groups

### Introduction

Each soil is placed into one of four groups according to the rate of surface infiltration of water; when the entire soil is thoroughly wetted. Infiltration under thoroughly wetted conditions is correlated positively with internal transmission of water, and thus negatively with runoff potential. Infiltration and transmission of water is not the same as permeability. For instance, a rapidly permeable soil, such as plumer, will have a very slow infiltration and transmission rate when thoroughly wetted because of a stagnant water table. Descriptions of the different hydrologic soil groups are as follows:

- Group A** Soils have high infiltration rates even when thoroughly wetted, consisting chiefly of deep, well to excessively drained sands and/or gravels. These soils have a high rate of water transmission and would result in a low runoff potential.
- Group B** Soils have moderate infiltration rates when thoroughly wetted, consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission and a moderate runoff potential.
- Group C** Soils have a slow infiltration rate when thoroughly wetted, consisting chiefly of soils with a layer that impedes the downward movement of water or soils with moderately fine texture and a slow infiltration rate. These soils have a slow rate of water transmission and a high runoff potential.
- Group D** Soils have very slow infiltration rates when thoroughly wetted, consisting chiefly of clay soils with a high swelling potential, soils with a high permanent water table, soils with claypan or clay layer near the surface and shallow soils over nearly impervious materials. These soils have a very slow rate of water transmission and a very high runoff potential.



#### IV. Inventories and TR-55 Calculations

In June of 1986 the U.S.D.A. Soil Conservation Service issued the second edition of "Urban Hydrology for Small Watersheds" Technical Release 55. This release presents the currently accepted procedures for calculating storm runoff volume, time of concentration and time of travel, and peak rate of discharge. This method generated with computers the following calculations.

TR-55 CURVE NUMBER COMPUTATION

VERSION 1.1

Project : Morris Road Watershed  
 County : Worcester  
 Subtitle:  
 Subarea : 1

State: MD

User: Chip  
 Checked: \_\_\_\_\_

Date: 12-15-9  
 Date: \_\_\_\_\_

COVER DESCRIPTION	Hydrologic Soil Group			
	A	B	C	D
Acres (CN)				
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns, parks etc.)	-	-	-	-
Poor condition; grass cover ( 50%	-	-	2(86)	-
Fair condition; grass cover 50% to 75%	-	-	19.5(79)	-
Good condition; grass cover ) 75%	-	-	9(74)	-
Streets and roads				
Paved; open ditches (w/right-of-way)	-	-	4(92)	-
Dirt (w/ right-of-way)	-	-	1(87)	-
Residential districts      Avg % imperv				
(by average lot size)				
1/8 acre (town houses)      65	-	-	12(90)	-
1/4 acre      38	-	-	4.25(83)	-
CULTIVATED AGRICULTURAL LANDS				
Fallow      Crop residue (CR)      poor	-	-	19.5(90)	-
Row crops      Straight row (SR)      good	-	-	244(85)	-
OTHER AGRICULTURAL LANDS				
Woods      fair	-	-	57(73)	-
Total Area (by Hydrologic Soil Group)			372.	
			====	

SUBAREA: 1      TOTAL DRAINAGE AREA: 372.25 Acres      WEIGHTED CURVE NUMBER:83

Project : Morris Road Watershed  
 County : Worcester State: MD  
 Subtitle:

User: Chip Date: 12-15-90  
 Checked: Date:

----- Subarea #1 - 1 -----  

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.6	300	.003	c					0.38
Shallow Concent'd		400	.003	u					0.12
Open Channel		7260						2	1.00

Time of Concentration = 1.51\*  
 =====

Shallow Concent'd		400	.003	u					0.12
Open Channel		7260						2	1.00

Travel Time = 1.13\*  
 =====

--- Sheet Flow Surface Codes ---

A Smooth Surface	F Grass, Dense
B Fallow (No Res.)	G Grass, Bermuda
C Cultivated ( 20 % Res.	H Woods, Light
D Cultivated > 20 % Res.	I Woods, Dense
E Grass-Range, Short	

--- Shallow Concentrated ---  
 --- Surface Codes ---  
 P Paved  
 U Unpaved

\* - Generated for use by TABULAR method

Project : Morris Road Watershed  
County : Worcester  
Subtitle:

User: Chip  
Checked: \_\_\_\_

Date: 12-15-90  
Date: \_\_\_\_

Total watershed area: 0.582 sq mi Rainfall type: DMV Frequency: 50 years  
----- Subareas -----

1  
Area(sq mi) 0.58\*  
Rainfall(in) 7.3  
Curve number 83\*  
Runoff(in) 5.31  
Tc (hrs) 1.51\*  
(Used) 1.50  
TimeToOutlet 0.00  
Ia/P 0.06  
(Used) 0.10

Time (hr)	Total Flow	----- Subarea Contribution to Total Flow (cfs) ----- 1
11.0	19	19
11.3	25	25
11.6	31	31
11.9	43	43
12.0	53	53
12.1	65	65
12.2	90	90
12.3	124	124
12.4	167	167
12.5	222	222
12.6	281	281
12.7	340	340
12.8	395	395
13.0	466	466
13.2	504P	504P
13.4	470	470
13.6	442	442
13.8	414	414
14.0	386	386
14.3	346	346
14.6	309	309
15.0	269	269
15.5	226	226
16.0	192	192
16.5	164	164
17.0	139	139
17.5	117	117
18.0	102	102
19.0	77	77
20.0	62	62
22.0	43	43
26.0	15	15

P - Peak Flow \* - value(s) provided from TR-55 system routines

## V. Current Drainage Patterns

As can be seen from the survey, the main ditching patterns which currently exist are logical, but they are not adequate to cover the entire area in stress. They are also limited by their size and cannot convey enough water to minimize the threat of flooding under normal circumstances. Most of these existing ditches are also in serious need of maintenance and some need reconstruction in order for them to function as originally designed. Many existing ditches have banks which are too steep for vegetative cover to stabilize them properly. In all cases the existing culverts are at least partially clogged with sediment and growth, or the headwalls of the associated ditches are eroded dangerously close to the roadbeds. Where these ditches run adjacent to fields in use for agricultural activities, there is little or no buffer strip. Exhibit 5.1, attached, notes these problems graphically.

Proper drainage can not occur under these conditions. Adequate ditching must be designed, a proper maintenance schedule put into effect and all necessary environmental safeguards must be employed. Whatever cost is incurred in making these improvements will be more than offset by the economic gain realized in improved agricultural production, lower maintenance cost in reference to the road and positive environmental impact. The cost of maintaining an adequate drainage system is less than the cost of rebuilding a drainage system. Attached is the survey labeled Exhibit 5.2.



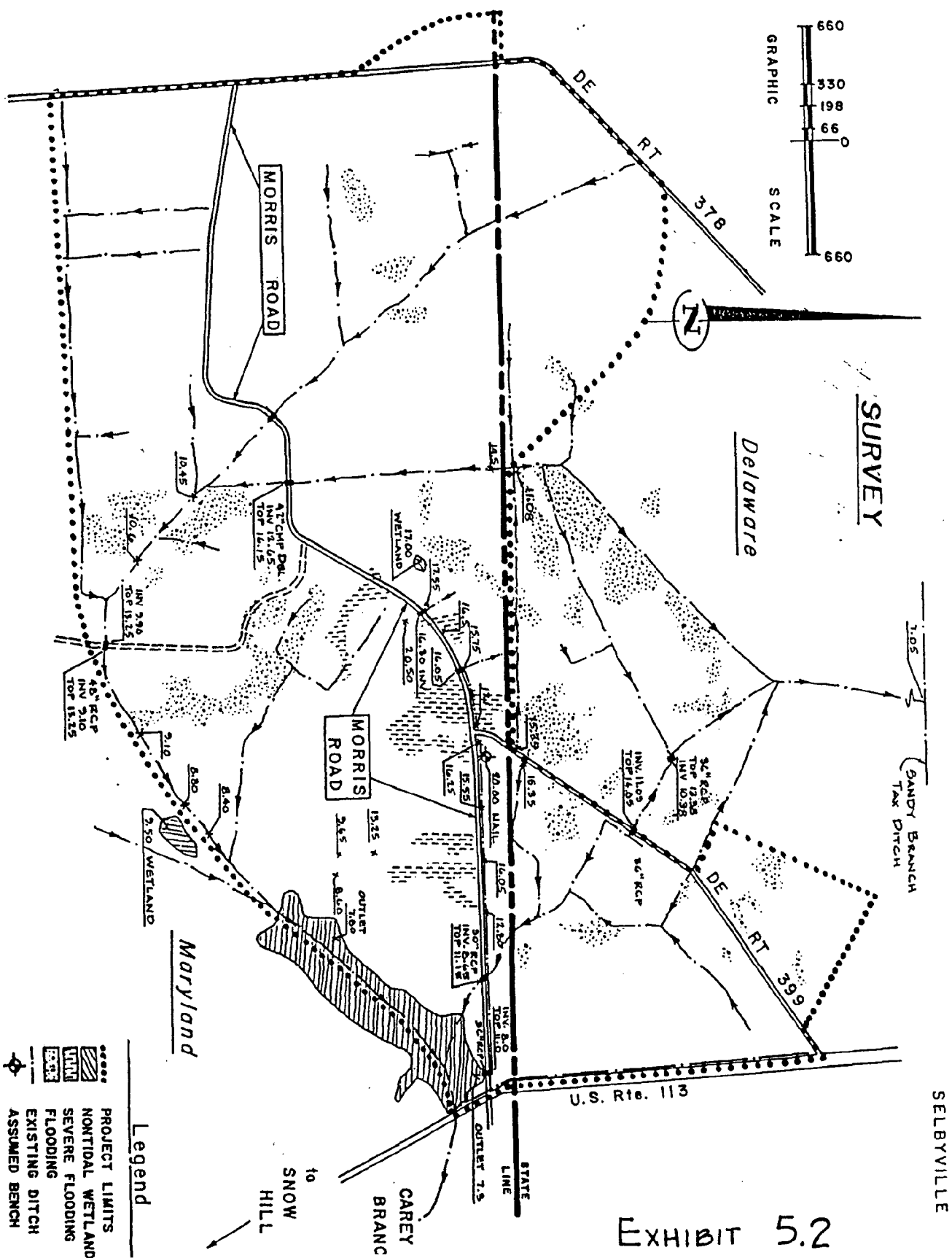


EXHIBIT 5.2

## VI. Planned Improvements

The primary purpose of this report is to provide options to alleviate the periodic flooding of Morris Road and adjacent properties. The most severe problems are shown on the survey (Exhibit 5.2) and noted as areas of severe flooding. These areas cause a threat to the health and safety of the residents in the area because of the standing water which is slow to drain or percolate and because it renders the road impassable; therefore making quick access for emergency medical treatment impossible. An additional hazard, as was noted in the introduction, is the presence of high tension power lines in the area. These power lines are within close enough proximity to make contact with ponds created by inadequate surface drainage.

Following are different plans designed to alleviate the drainage problems along the road and the severe flooding which occurs immediately adjacent to it, as well as, providing drainage in other areas where access to efficient ditching does not currently exist.

Discussed after these plans, but of equal importance, are several measures to provide environmental safeguards. None of the drainage plans should be considered without employing the appropriate environmental measures.

### Plan #1

Note that there currently exists a Delaware tax ditch which runs west along the state line from Rt. 399. This is part of the Sandy Branch Tax Ditch system. Because of its proximity to the problem area, it would be advantageous to drain into it. The map labeled Plan 1 shows how this would be possible by constructing a new roadside ditch along the south side of Morris Road with laterals south along the property lines between properties P-13 and P-5, P-1 and P-13, and P-8 and P-1. This water would then be transported by way of a 24" eccentric (squash) pipe north under Morris Road and along the easterly property line of P-9A to outfall into the tax ditch. Another roadside ditch along the north side of Morris would also drain into this outfall ditch. Contact with the chairman of the Sandy Branch Tax Ditch Association has been made and the officers of that Association are inclined to help. The property owner on whose land the tax ditch exists is also willing to allow the new construction on his property. The conditions of both are listed in Appendix B. The total area of the watershed which would drain into the Sandy Branch system would be approximately 8 acres.

### Plan #2

This plan drains the same 8 acres as Plan 1, but follows Rt. 399 to outfall into Sandy Branch. Though it is a feasible plan it will not be as efficient as Plan 1 because of the extended distance of transportation which will force a less positive grade to the outfall. This plan should be used only if it becomes impossible to obtain an easement from the property owners along the outfall ditch noted in Plan 1.



### Plan #3

This concerns the areas of severe flooding shown west of the ROW corridor of Delmarva Power and Light. A roadside ditch along the northwesterly side of Morris Road would have a sufficiently positive grade to conduct this stormwater to intercept the existing ditch shown as Ditch A on the accompanying plan. This existing ditch is large enough to accept the added influx of water and only requires improved stabilization and maintenance of the existing culverts. The best method of stabilizing both the inlets and outfalls of these culverts would be the use of stone or concrete, due to the steepness of the banks and the highly erosive effect of the great volumes of runoff that flow through this ditch. The final outfall of this ditch is into Carey Branch.

### Plan #3A

There currently exists a ditch (shown on the accompanying plan as Ditch B) which could be made more effective by reversing its flow back to the roadside ditch discussed in Plan 3 above. This ditch currently connects to a private system of drainage ditching which runs through a very narrow and circuitous route to eventually outfall into Ditch A. Because this ditching system is so narrow and extended, the flow rate is extremely slow and the adjacent area of severe flooding is not sufficiently relieved. The ditch to be reversed is approximately 450 feet long and cuts through the area of ponding which needs to be better drained. It would have to cross Morris Road by way of an 18" reinforced concrete pipe and join the roadside ditch described in Plan 3. This plan would be less expensive than widening and maintaining the aforementioned private ditching system.

### Plan #4

This plan covers the area of Morris Road between Rt. 339 and U. S. Rt. 113. There is an existing ditch running along the north side of the road, however, it has become filled-in and overgrown. Due to the fact that the right of way (R.O.W.) of Morris Road is only thirty feet, there is not enough room in the R.O.W. for an adequately sized ditch. Dan Massey, of Delmarva Power & Light, has been contacted in reference to relocating the low voltage transmission lines which are located on the north side of the road, and is looking into the cost of this activity. Also, the owner of property P-16A has expressed interest in better drainage of his land and may be willing to accept a 15' easement along the road. As is shown on the attached plan, there is adequate relief to allow a ditch grade of .38% from Rt. 339 to the existing main outfall ditch into Carey Branch. This ditch crosses property P-129-3 diagonally and an easement would have to follow it as well. The existing culvert under Morris Road is not quite large enough at 30" and should be increased to a 36" eccentric pipe in order to better manage the flow.

This plan also requires a short road ditch on the south side of Morris Road, with laterals down the division lines of Properties P-7 and P-8, and P-8 and P-10. This water would be conveyed under Morris by way of an 18" reinforced concrete pipe.

## Plan #5

This provides shallow ditches to fields which are not otherwise drained and exhibit signs of intermittent flooding. These ditches should be shallow and wide in order to promote good stabilization through vegetation. That vegetative cover would also adequately filter the stormwater runoff prior to it reaching the main trunk lines of the drainage system and Carey Branch. A positive grade of .3% minimum would be required to ensure that the flow is not interrupted.

The following are necessary environmental measures.

### Measure #1

All ditches throughout the drainage system, whether it is new construction or currently existing, require a 15 foot easement. This is to provide legal access for inspections to be scheduled at least once every 2 years and for the purpose of conducting scheduled and emergency maintenance.

### Measure #2

Periodic maintenance will be scheduled as necessary after every inspection. These maintenance activities will include:

- a. Clearing, "when no other practical alternate exists".
- b. Mowing, in order to restrict the growth of woody vegetation and scrub. And to promote the dense growth of herbaceous vegetation.
- c. Excavation, to maintain the designed grades and cross sections, or to clean existing or construct new sediment traps.
- d. Herbicide application as approved by the soil conservation service.
- e. Obstruction removal, such as deadfall or trash deposits.

### Measure #3

Buffer strips at a minimum of 10 feet, in the case of a roadside ditch, and 15 feet throughout the rest of the system are necessary to provide filtration of sediment and nutrients prior to the system. The maintenance by the adjacent property owners of these buffer strips should be strictly enforced.

#### Measure #4

Vegetative stabilization of all ditches should also be mandatory in order to protect the system and ultimately Carey Branch against erosion and sedimentation and the influx of nutrients. The accompanying plan denotes existing ditches whose slopes should be recut in order to be properly stabilized.

#### Measure #5

Sediment traps shall be installed immediately before each major culvert. The attached plan, Measure #5, shows these locations, as well as, their size and depth.

#### Measure #6

Any private ditching that makes use of the drainage system, or other construction for the purpose of stormwater control must adopt Measures 2 through 5 providing such construction occurs within the delineated watershed. The provisions of Plan 5 should also be mandatory design standards for new construction.

#### Measure #7

Possibly the most important improvement of the system would be the construction of sediment basins. These should be shallow (approximately 12" to 3' in depth) and planted with freshwater aquatic vegetation. The attached plans labeled Measure #7A, B & C show the best possible locations for these basins and all should be used if possible.

#### Measure #8

Any future additions to the drainage system will adhere strictly to the provisions of the nontidal wetlands regulations as well as all other applicable laws and regulations. The permits obtained for the implementation of improvements outlined in this report are specifically intended for this design and do not constitute a blanket approval from any authority for the watershed.

#### Measure #9

The soil from both new construction and reconstruction should be good fertile soil for the most part. It should be kept within the watershed if possible. The best location is noted on the accompanying plan. This property is currently lying fallow and would supply a natural sediment control barrier while grading and seeding are taking place. However, if property owners within the watershed choose to auction off the soil as fill material the governing body should arrange to do so. A necessary stipulation should be that no bid will be accepted without

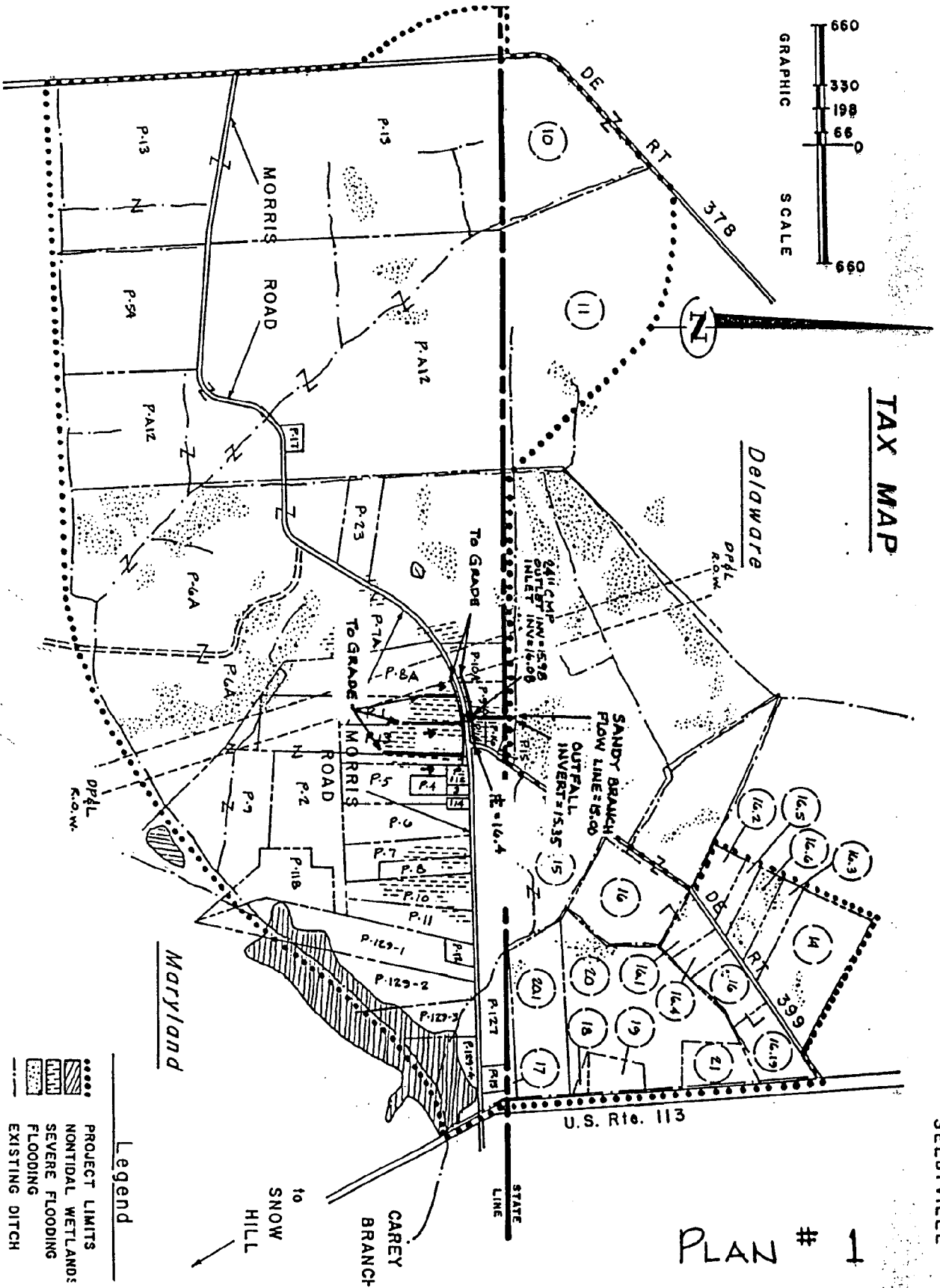
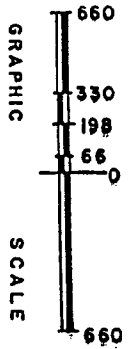
a satisfactory sediment-erosion control plan. Any and all proceeds will be applied to the cost of the implementation of planned improvements.

**Measure #10**

As a general rule, the standard guidelines of state "Public Watershed Association Operations and Maintenance Plan" are an excellent tool and acceptable to this report with the exception of the widths of buffer strips.

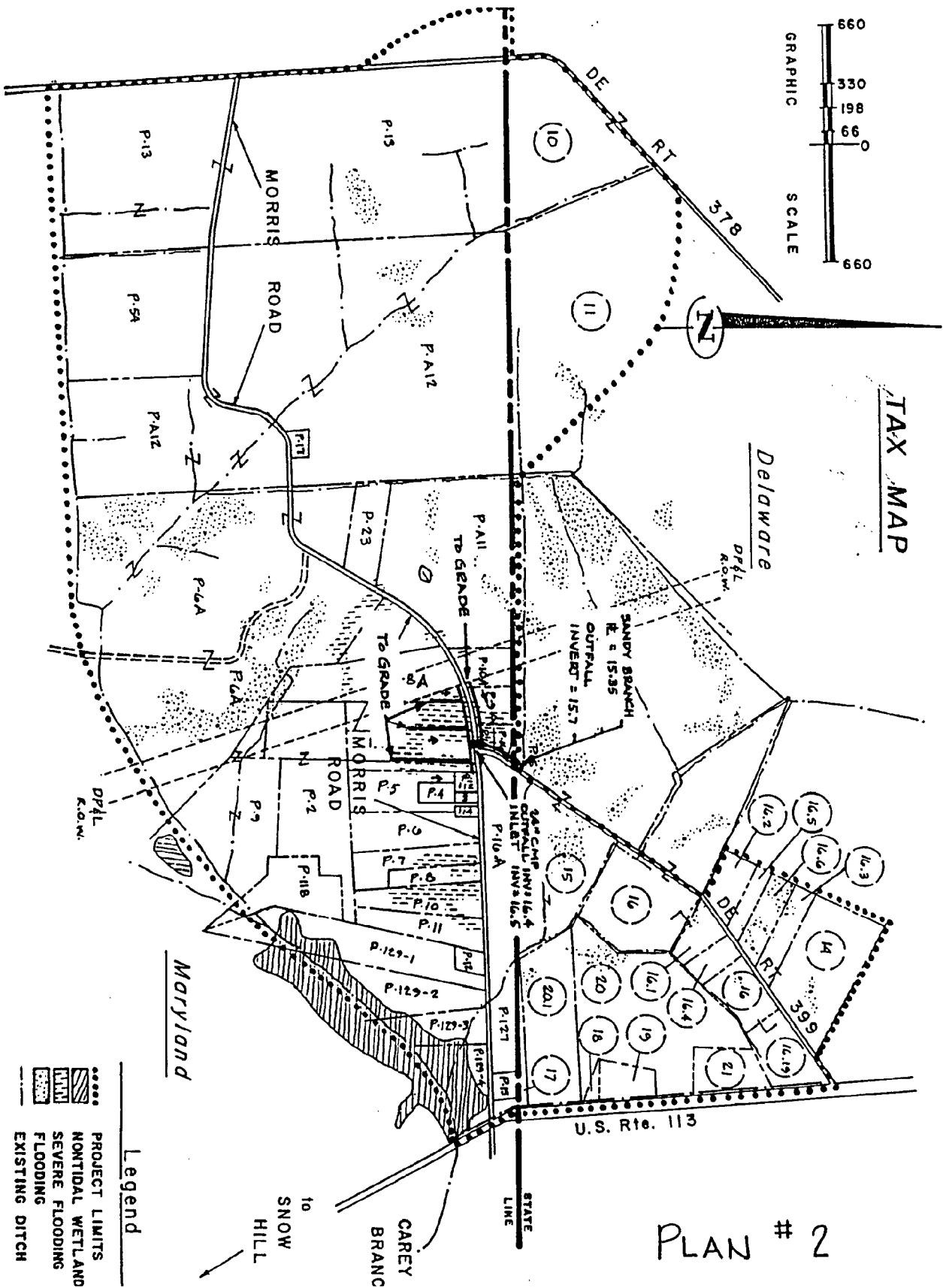
SELBYVILLE

# TAX MAP



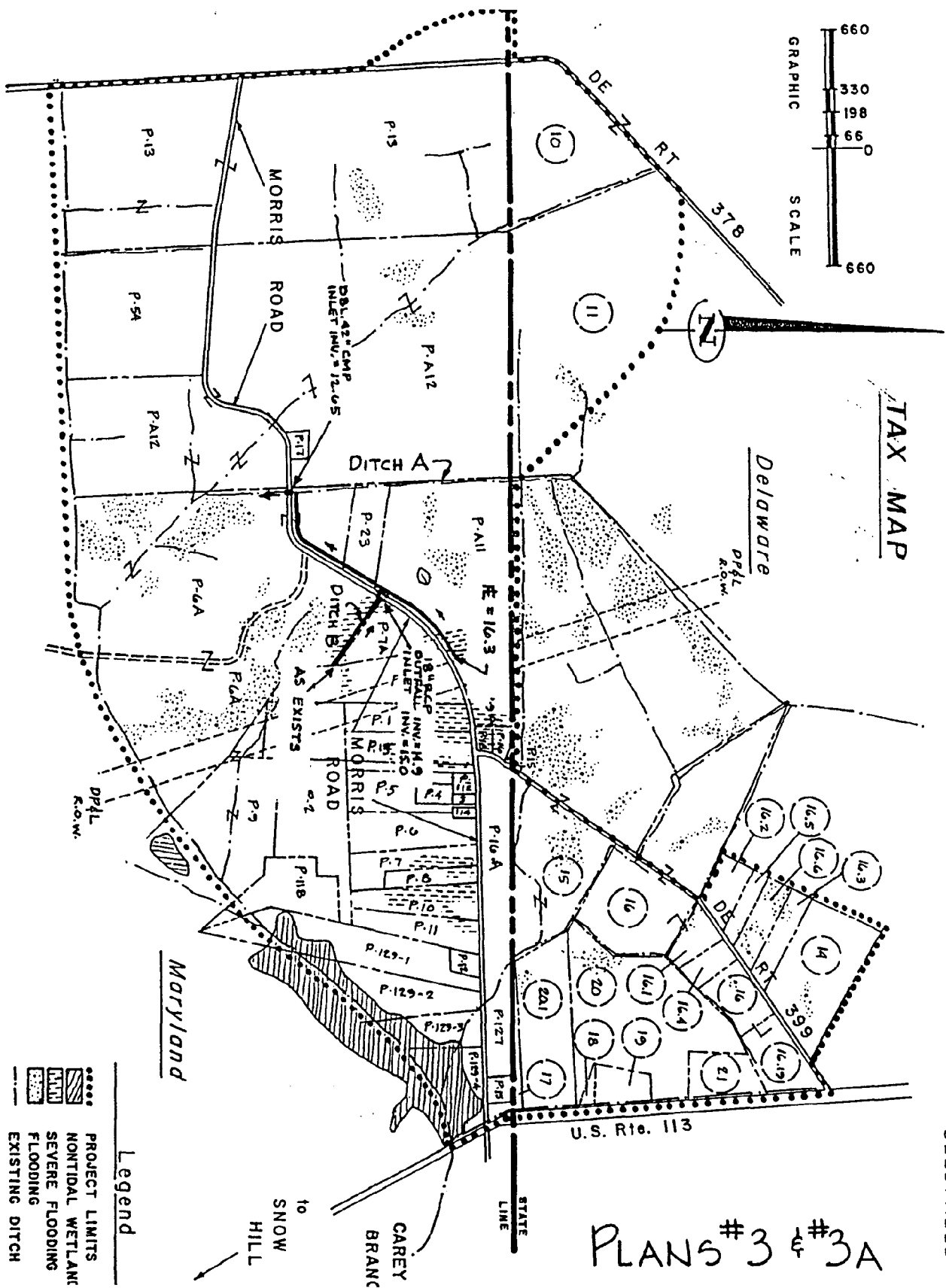
- Legend
- PROJECT LIMITS
  - NONTIDAL WETLANDS
  - SEVERE FLOODING
  - FLOODING
  - EXISTING DITCH

PLAN # 1



PLAN # 2

SELBYVILLE

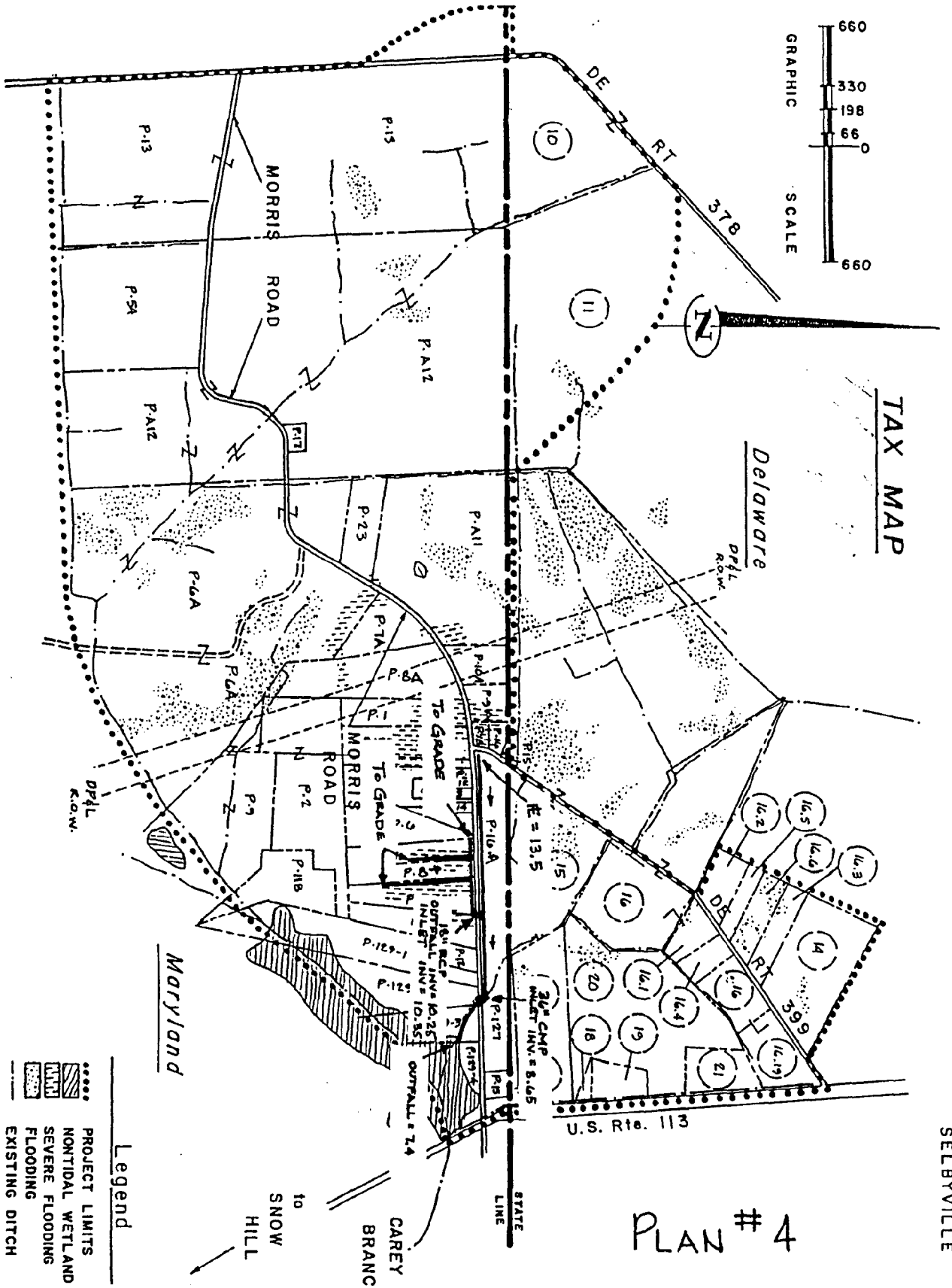


# TAX MAP

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PLANS #3 & #3A

- Legend**
- ..... PROJECT LIMITS
  - ▨ NON-TIDAL WETLAND
  - ▨ SEVERE FLOODING
  - ▨ FLOODING
  - ▨ EXISTING DITCH



PLAN # 4

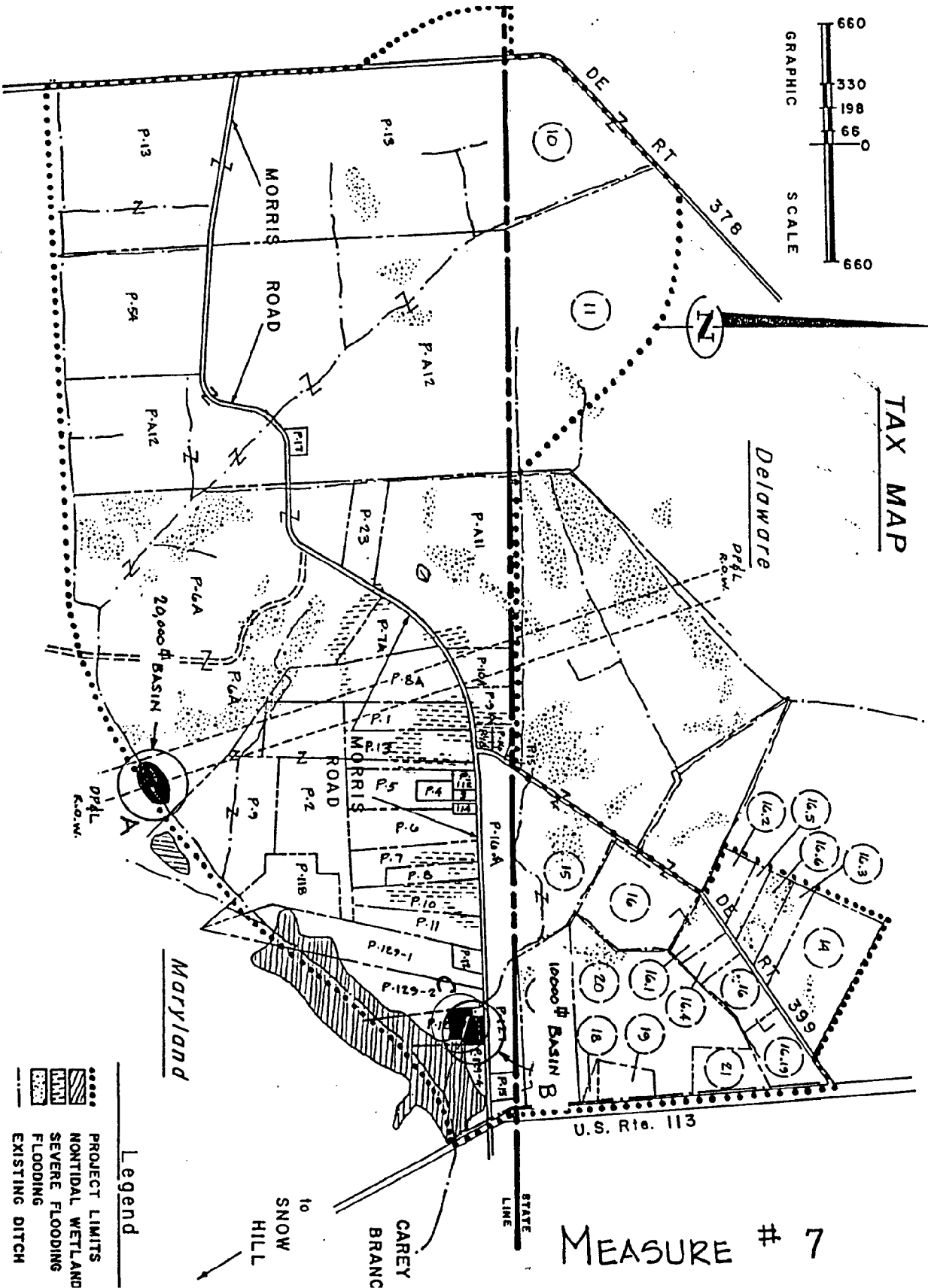
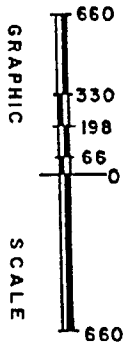


## SELBYVILLE





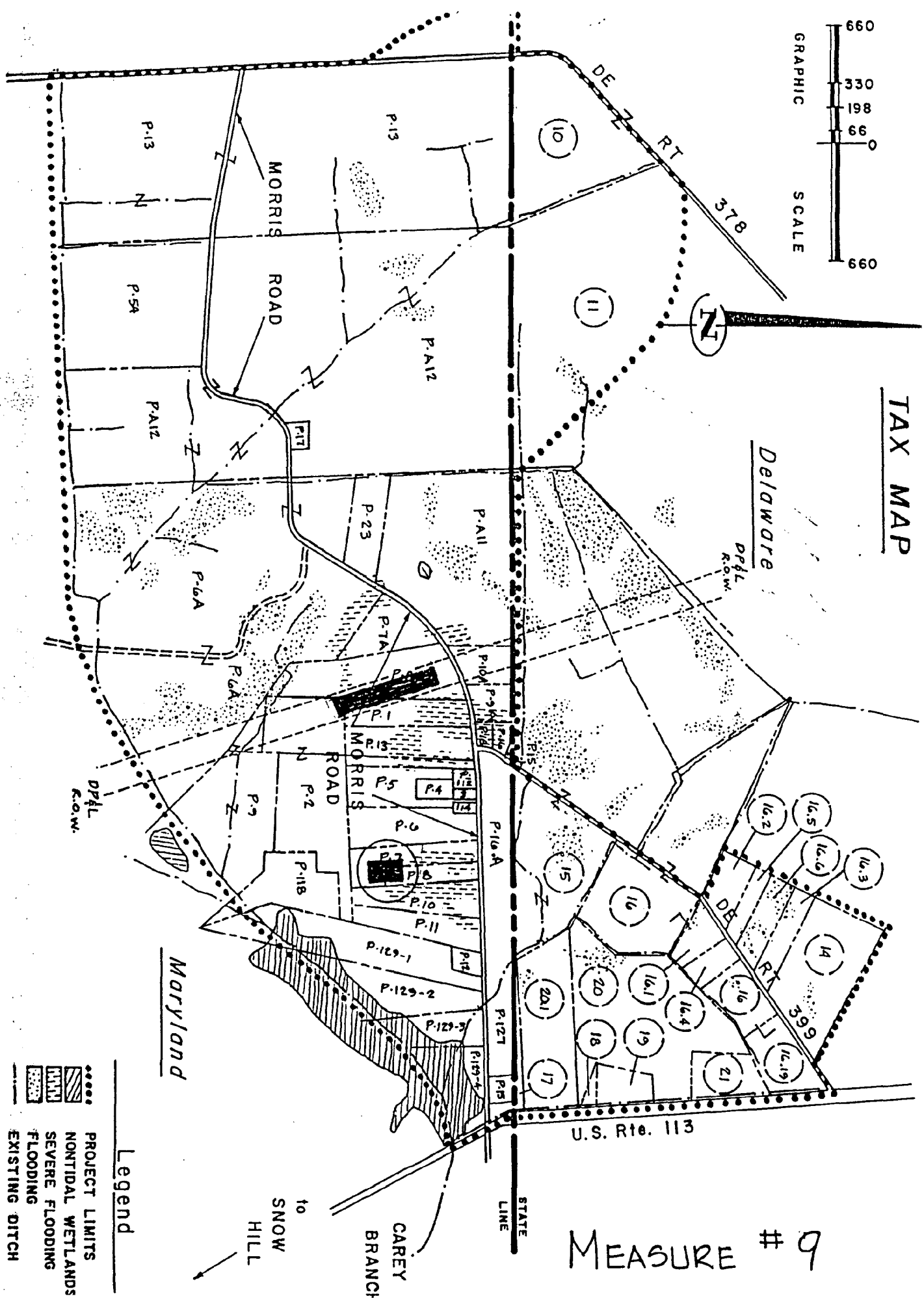
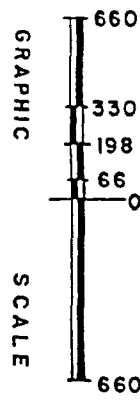
# TAX MAP



MEASURE # 7

- Legend
- PROJECT LIMITS
  - NONTIDAL WETLAND
  - SEVERE FLOODING
  - FLOODING
  - EXISTING DITCH

# TAX MAP



## Legend

- ..... PROJECT LIMITS
- ▨ NONTIDAL WETLANDS
- ▨ SEVERE FLOODING
- ▨ FLOODING
- ▨ EXISTING DITCH

MEASURE #9

## VII. Possible Funding Sources

The greatest difficulty with implementing improvements in any drainage project is in locating funding. Several possible sources have been contacted and the results of that survey follow.

### Delmarva Power & Light

The enginner for R.O.W.s responsible for the Morris Road area is Mr. Dan Massey. He was approached in reference to moving the low voltage transmission lines running alongside of the road in order to find room to make the necessary improvements to the ditch. If given an easement the power company is generally happy to move power lines, but usually at the applicant's expense. He did, however, sound hopeful that in this case an exception might be made and the power company would pay for this action themselves. A copy of the letter in which this request was made can be found in Appendix C. A final decision has not as yet been reached.

### The Maryland Department of the Environment

Ms. Kathy Drazek, with this department, has been instrumental in trying to locate funds within various programs administered through the Maryland Department of the Environment. One source might be the Maryland Cost Share Program which would cover up to 75% of the project.

A second possiblility may be a program titled MACS (Maryland Agricultural Coast Share Program), which may pay for 87.5% of the improvements. Research on the legislation of this program is continuing.

A third possibility, though less likely, is the program of Supplemental Funding. This may be of help through part of the project, but is seldom used except in cases of necessary improvements to utilities.

There is also a program titled the State Revolving Fund, which though is not a full funding program, acts as a loan with an interest rate of 5% (currently).

Though research is continuing with the Maryland Department of the Environment, they appear to be the most likely to support the project. As information surfaces it will be made available to the commissioners as an addendum to the report.

### The Maryland Department of Agriculture

Mr. Mark Berry, a program assistant for the Water Quality Cost Share Program, sounded hopeful that his funding could be utilized here. However, this could not be done unless Measure #5 was implemented, then the Morris Road plans would be rated next to the other applicants to the program throughout the state. A decision on this program's investment in our project could not be expected until the end of May, 1990. Should we be rated high enough to receive monies from them, they are authorized to

pay 65% of the project up to a ceiling amount of \$10,000.00 per pond and \$25,000.00 per project.

#### Local Property Owners

Though not all the property owners in the area have been contacted, the ones who have been approached with the idea of forming a public watershed association have replied favorably. In view of the severe conditions to be found in the area, it is difficult to perceive that any less than a majority would not respond favorably.

#### Worcester County

Once the commissioners have reviewed and accepted this study and the cost estimates (Appendix A), application to these various funding programs is possible. However, it is doubtful that the entire cost of the improvements suggested herein will be paid by the government agencies. If a PWA can not be formed or can not absorb the remaining costs, it would become necessary for the county commissioners to either accept the responsibility themselves, or perhaps to arrange a loan to the PWA.

## **Acknowledgements**

**Funding for the  
DRAINAGE STUDY  
for**

**THE MORRIS ROAD AREA**

**was made jointly by the**

**Maryland Department of Natural Resources  
Water Resources Administration**

**and**

**National Oceanic and Atmospheric Administration  
Office of Coastal Resources Management**

**We would like to thank the Worcester County Drainage Steering Committee  
for their help and guidance in gathering data and the preparation of this document.**

## Appendix A

### Cost Estimates

#### Plan #1

Right to Outlet into Sandy Branch Tax Ditch- Tax Ditch Association	\$ 250.00
Property Owner of Tax Ditch	500.00

Roadside Easements	920 lf x 10' = 9200 sq. ft. @ 2000/acre	422.41
Lateral Easements	1000 lf x 15' = 15000 sq. ft. @ 2000/acre	688.71
10' of 30" CMP	@ 25.27/ft	252.70
25' of 24" CMP	@ 19.93/ft	498.25
Excavation	2300 cu yds @ 3.00/cu yd	6900.00
Grading/Shaping	28250 sq ft @ 2800/acre	1815.89
Establish Cover	28250 sq ft @ 500/acre	324.27
Road Patch	100 sq ft @ 3.00/sq ft	300.00
Total		\$ 12138.18

#### Plan #2

Right to Outlet in Sandy Branch Tax Ditch Tax Ditch Association	250.00
Property Owner of Tax Ditch	500.00

Roadside Easements	1146 lf x 10' = 11460 sq ft @ 2000/acre	526.17
Lateral Easements	1000 lf x 15' = 15000 sq ft @ 2000/acre	688.71



10' of 30" CMP	@ 25.27/ft	252.70
25' of 24" CMP	@ 19.93/ft	498.25
Excavation	2140 cu yds @ 3.00/cu yd	6420.00
Grading/Shaping	26460 sq ft @ 2800/acre	1700.83
Establish Cover	26460 sq ft @ 500/acre	303.72
Road Patch	100 sq ft @ 3.00/sq ft	300.00
Total		\$ 11440.38

#### Plan #3

Roadside Easements	1200 lf x 10' @ 2000/acre	550.96
Excavation	570 cu yds @ 3.00/cu yd	1710.00
Grading/Shaping	12000 sq ft @ 2800/acre	771.35
Establish Cover	12000 sq ft @ 500/acre	137.75
Total		\$ 3170.06

#### Plan #3A

Lateral Easement	450 lf x 15' @ 2000/acre	309.92
Excavation	45 cu yds @ 3.00/acre	135.00
Grading/Shaping	6750 sq ft @ 2800/acre	433.89

Establish Cover	6750 sq ft @ 500/acre	77.48
Road Patch	100 sq ft @ 3.00/sq ft	300.00
Total		\$ 1634.54

#### Plan #4

Roadside Easements	1850 lf x 10' = 18500 sq ft @ 2000/acre	849.40
Lateral Easements	920 lf x 15' = 13800 sq ft @ 2000/acre	633.61
Outlet Easement	306 lf x 15' = 4590 sq ft @ 2000/acre	210.75
Excavation	680 cu yds @ 3.00/cu yd	2040.00
Site Prep (clear brush)	306 lf @ 0.60/ft	185.00
Grading/Shaping	36890 sq ft @ 2800/acre	1694.00
Establish Cover	36890 sq ft @ 500/acre	424.00
25' of 18" CMP	@ 15.13/ft	378.25
25' of 36" eccentric	@ 45.06/ft	1126.50
Road Patching	225 sq ft @ 3.00/ft	675.00
Total		\$ 7794.75

Plan #5

Easements	1275 lf x 15' = 19125 sq ft	878.10
Excavation	71 cu yds @ 3.00/cu yd	213.00
Grading/Shaping	19125 sq ft @ 2800/sq ft	1229.34
Establish Cover	19125 sq ft @ 500/acre	219.53
Total		\$ 2539.97

Measure #1

Easements	18750 lf x 15' = 281250 sq ft @ 2000/acre	12913.22
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Measures #3 & 4

Grading/Shaping	6.46 acres @ 2800/acre	18088.00
Stabilization Netting	62000 sq ft @ 0.14/sq ft	8680.00
Establish Cover	6.46 acres @ 500/acre	3230.00
Total		\$ 29998.00

Measure #5

Excavation	18 cu yds @ 3.00/yd	\$ 54.00
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Measure #7

A) 20000 square foot pond

Excavation	5000 cu yds @ 3.50/cu yd	17500.00
30' of 24" CMP	@ 18.85/lf	565.50
36" Riser	@ 96.31	96.31
Clearing	12000 sq ft @ 2000/acre	551.00
Establish Buffer	1000 sq ft @ 500/acre	12.00
Rip-Rap Outfall	4 tons @ 30/ton	120.00
Total		\$ 18844.81

B) 10000 square foot pond

Excavation	1800 cu yds @ 3.50/cu yd	6300.00
30' of 18" CMP	@ 14.72	441.60
24" Riser	@ 85.68	85.68
Clearing	12000 sq ft @ 2000/acre	551.00
Establish Buffer	1000 sq ft @ 500/acre	12.00
Rip-Rap Outfall	4 tons @ 30/ton	120.00
Total		\$ 7510.28

C) 10000 square foot pond

Excavation	2400 cu yds @ 3.50/cu yd	8400.00
30' of 18" CMP	@ 14.72	441.60
24" Riser	@ 85.68	85.68
Establish Buffer	1000 sq ft @ 500/acre	12.00
Rip-Rap Outfall	4 tons @ 30/ton	120.00
Total		\$ 9059.28

## Appendix B

The Sandy Branch Tax Ditch Association controls an area which is over 1,788 acres. As noted in the report under Section VI, they have agreed to allow the Morris Road watershed to drain into their system. They do, however, require certain stipulations to be included within any final agreement:

1. They agree only to accept the stormwater runoff collected from the area outlined in Plan 1 (approximately 8 acres). Any extension of this must be negotiated separately and they withhold the right to final veto.
2. Whether Plan 1 or Plan 2 are employed, a corrugated metal pipe a minimum of 10 feet in length must be placed at the outfall.
3. The invert of the outfall may not be lower than the invert of the tax ditch at the point intersection.
4. As compensation, the Sandy Branch Tax Ditch Association will require a one time payment of \$250.00.
5. The tax ditch in question lies completely within the property lines of Clifton R. Parker, Jr. He also requires a one time payment of \$500.00 as compensation for crossing his property

The officers of the Sandy Branch Tax Ditch Association are:

1. Mr. Clifton R. Parker, Jr.                      302 436 2128  
R.R. 3, Box 184-A  
Frankford, DE 19945  
Chairman
2. Mr. Gerald W. Evans                              302 436 8035  
R.R. 2, Box 195-A  
Selbyville, DE 19975  
Manager
3. Mr. Emory D. McCabe                              302 436 5438  
R.R. 2, Box 201                                      302 629 1830  
Selbyville, DE 19975  
Secretary/Treasurer

## APPENIX C

Date:

The Commissioners of Worcester County  
Room 116, Courthouse  
Snow Hill, Maryland 21863

Re: Public Watershed Association  
for the area of Morris Road

Property Owner,

Recently the county has had a drainage study completed for the watershed centered around Morris Road. A plan has been developed which would relieve the flooding along the road. The implementation of this plan depends on the participation of the property owners within the watershed. This would be in the form of a Public Watershed Association. In order to form a PWA, a majority of the property owners concerned must vote favorably at a public hearing. There will be ample opportunity to study the plan and make comment prior to this vote.

Attached please find a copy of the MORRIS ROAD DRAINAGE STUDY, and copy of YOUR PUBLIC WATERSHED ASSOCIATION - OPERATIONS AND MAINTENANCE PLAN. A public meeting will be held at (location, date, time) to discuss the formation of a PWA. No vote will be held at this date, but your presence and comments will be appreciated.

The Worcester County Commissioners

Date:

The Worcester County Commissioners  
Room 116, Courthouse  
Snow Hill, Maryland 21863

Re: Power lines in the area of  
Morris Road, Worcester County,  
Maryland

Mr. Dan Massey  
Delmarva Power & Light Co.  
P.O. Box 1739  
Salisbury, Maryland 21802-1739

Mr. Massey,

As you are aware, there is a drainage problem occurring in the area of Morris Road which the Commissioners are attempting to alleviate. One of the major concerns is the presence of high tension power lines running directly across the portion of the road with the greatest problem of flooding. This flooding not only inundates the road, but runs into the yards and under the houses in the vicinity. This can certainly be recognized as a great safety hazard.

We are counting on the help of Delmarva Power & Light Co. in resolving this problem. A plan has been developed to supply drainage to this area, but in order for it to be implemented, the low transmission lines running along the North side of the road between U.S. Rte 113 and DE Rte 399 must be relocated Northwards a distance of 8' to 10'. With this accomplished by your company, adequate drainage can be offered to the problem area. Please contact Hal Morris, Worcester County Planning Director at 632-1200 for any further information you may require.

Thank you,  
The Worcester County Commissioners



#### Appendix D

This can not be completed untill the Commissioners have made a decision on which of the alternative plans are to be implemented. Bay Country Consultants remains available to help in the preparation of these applications.

**RECEIVED**

FEB 23 1990

**COASTAL RESOURCES DIVISION  
TIDEWATER ADMINISTRATION**



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